

REMARKS

Claims 11-21 are pending in this application. By this Preliminary Amendment, Applicants AMEND the specification, the abstract of the disclosure and the drawings, CANCEL claims 1-10 and ADD new claims 11-21.

Applicants have attached hereto a Substitute Specification in order to make corrections of minor informalities contained in the originally filed specification. Applicants' undersigned representative hereby declares and states that the Substitute Specification filed concurrently herewith does not add any new matter whatsoever to the above-identified patent application. Accordingly, entry and consideration of the Substitute Specification are respectfully requested.

The changes to the specification have been made to correct minor informalities to facilitate examination of the present application.

Applicants have amended Figs. 13 and 15 to correct minor informalities contained therein.

Applicants respectfully submit that this application is in condition for allowance. Favorable consideration and prompt allowance are respectfully solicited.

Respectfully submitted,

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FIG. 13

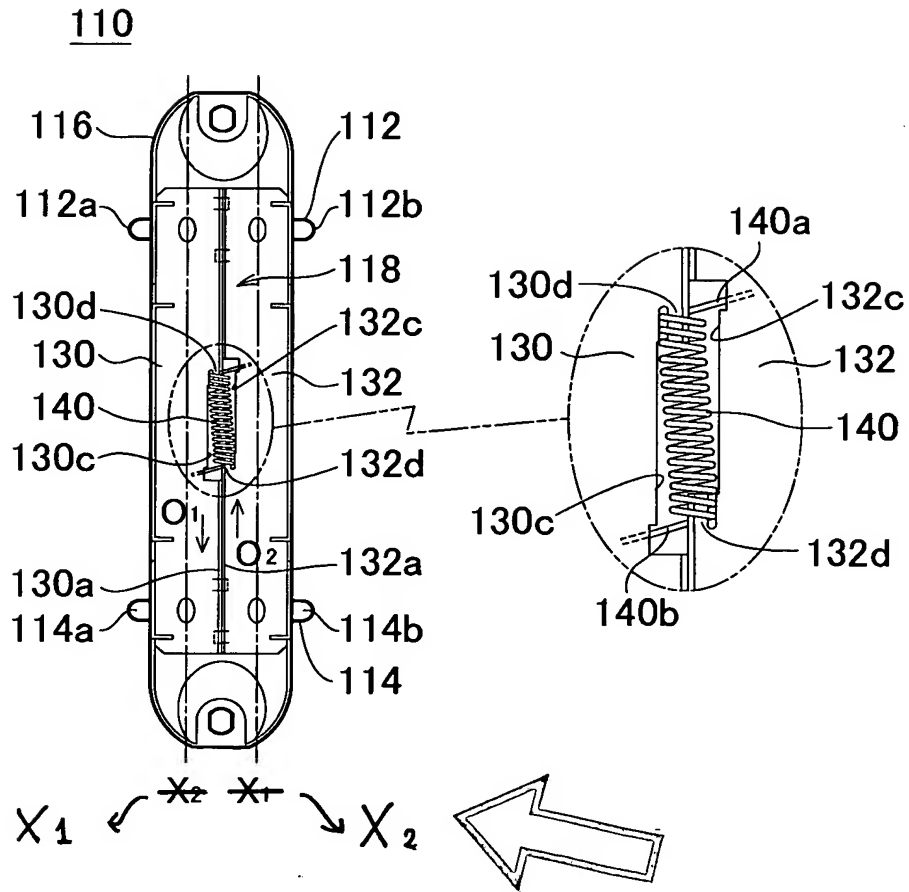


FIG. 14

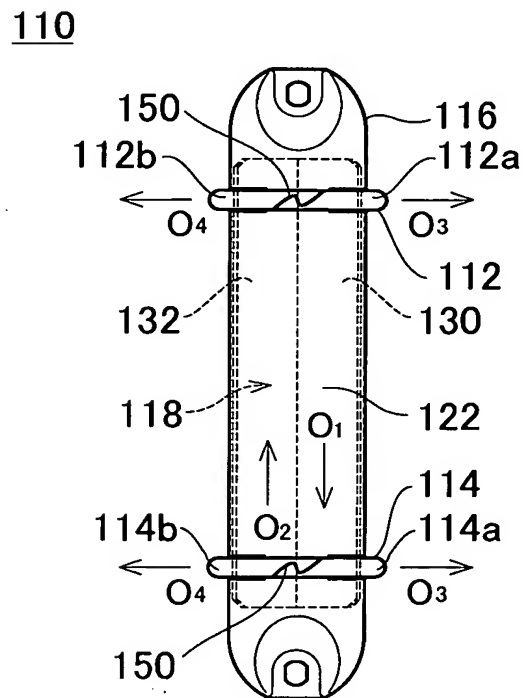


FIG. 15

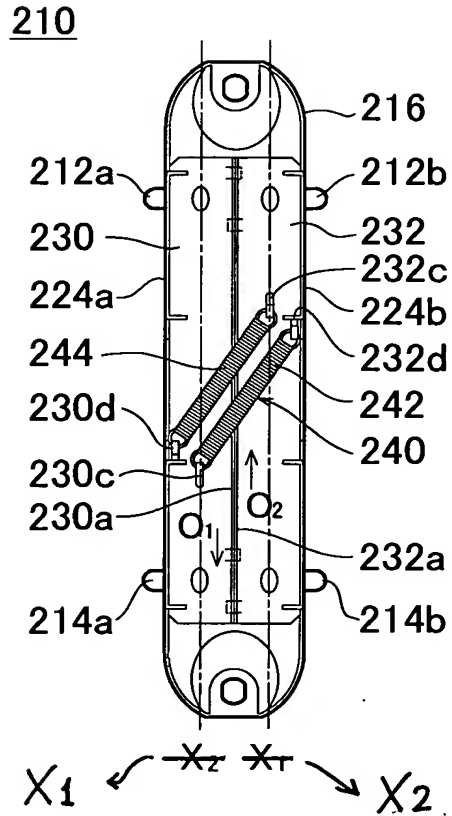
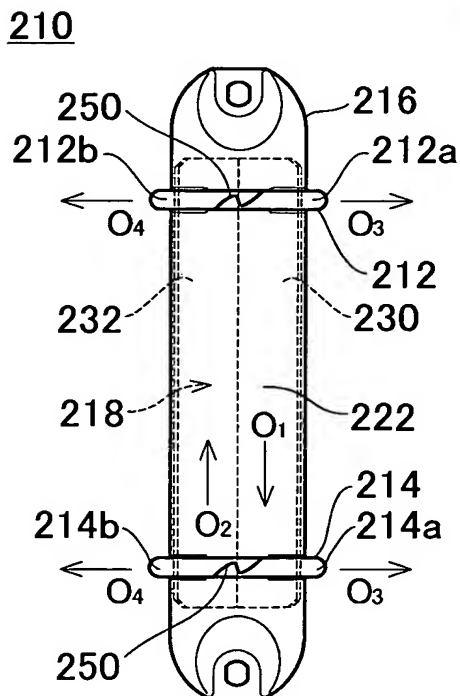


FIG. 16



**10/529432**

**JCO6 Rec'd PCT/PTO 25 MAR 2005**

# **MARKED-UP VERSION OF SUBSTITUTE SPECIFICATION**

10/529432

JCO6 Rec'd PCT/PTO 25 MAR 2009

TITLE OF THE INVENTION

Attorney Docket No. 38195.64

BINDING DEVICE

5 BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a binding device, and in  
particular, for example, to a binding device used for a ring  
binder or file.

10

2. Description of the Related Art

~~There~~A conventional binding device ~~is conventionally a~~  
~~ring binder as a kind of binding device. The ring binder is~~  
~~formed so~~ configured such that an approximately annular  
15 binding ring is engaged at its center so as to be closed. For  
example, if the ring is manually opened or closed, a pair of  
approximately semicircular binding half rings  
~~constituting~~which together define an approximately annular  
binding ring are pulled ~~away~~apart with fingers so as to be  
20 separated from each other, thereby opening the binding ring.

When the approximately annular binding ring is opened  
with fingers, however, it is difficult to open the pair of  
approximately semicircular binding half rings  
~~constituting~~defining the binding ring ~~can be hardly opened~~  
25 ~~with fingers in the case where~~when a relatively large

~~amount~~number of sheets of ~~an object such as a document is~~are  
bound.

Therefore, for example, a ring file disclosed in Japanese  
Patent Laid-Open Publication No. Hei 10-337988 has been  
5 proposed.

~~For a~~The so-called lever type binder of a conventional  
ring file disclosed in the above-cited patent publication,  
however, ~~there arises~~has the following problem. When a large  
amount of an object is to be bound by approximately annular  
10 binding rings of the ring file, the inner sides of levers are  
pushed outwardly and down so as to open the binding rings.  
However, when the levers are pushed outwardly and down ~~outward~~  
from the bound article side so as to open the binding rings,  
the bound article ~~becomes~~is an obstacle, ~~making~~which makes it  
15 difficult to push down the levers with fingers.

~~— In view of the above problems, the present invention has  
a principal object of providing a binding device which allows  
relatively easy opening and closing by manually handling  
binding rings of the binder.~~

20

#### SUMMARY OF THE INVENTION

In order to solve the problems described above, preferred  
embodiments of the present invention provide a binding device  
which allows relatively easy opening and closing by manually  
25 handling binding rings of the binder.

A binding device ~~recited in claim 1~~ according to a  
preferred embodiment of the present invention includes:  
binding rings~~;~~, a holding member having such a length that  
~~allows~~ permits the binding rings to be ~~provided~~ arranged at a  
5 distance~~;~~ from each other, and an operating member movably  
fixed inside the holding member ~~so~~ such that the respective  
bases of the binding rings are secured onto a surface of the  
operating member at a distance to secure the binding rings to  
the holding member, ~~wherein the~~. The operating member is  
10 ~~composed of~~ includes a pair of operating pieces ~~moving which~~  
move within the holding member in a longitudinal direction of  
the holding member~~;~~, the base of one of the binding rings is  
secured to one of the operating pieces, ~~whereas~~ and the base  
of the other binding ring is secured to the other operating  
15 piece~~;~~, the operating pieces are fixed to the holding member  
~~so~~ such that abutting edges thereof are ~~kept~~ maintained in an  
abutting state at a position separate from an inner surface of  
the holding member when the binding rings are closed, whereas  
the abutting edges are ~~kept~~ maintained in a direction of  
20 approaching the inner ~~face of the holding member when the~~  
~~binding rings are opened; and an opening/closing member is~~  
~~provided for shifting the binding rings in an opening~~  
~~direction such that the operating pieces are moved in the~~  
~~longitudinal direction of the holding member within the~~  
25 ~~holding member and are kept in a direction of approaching the~~

~~inner surface~~ of the holding member when the binding rings are opened, and an opening/closing member is provided for shifting the binding rings in an opening direction such that the operating pieces are moved in the longitudinal direction of the holding member within the holding member and are maintained in a direction of approaching the inner surface of the holding member when the binding rings are opened.

A-In the binding device according to ~~claim 2~~ this preferred embodiment of the present invention ~~is that recited in claim 1, wherein,~~ the holding member preferably includes holding walls ~~formed~~ disposed substantially parallel to a longitudinal direction, and the operating member has outer edges sliding inside the holding walls.

A-In the binding device according to ~~claim 3~~ this preferred embodiment of the present invention ~~is that recited in claim 2, wherein,~~ the operating member preferably includes a pair of operating pieces ~~sliding~~ that slide within the holding member in a longitudinal direction of the holding member, the pair of operating pieces have outer edges ~~sliding~~ that slide in the longitudinal direction of the holding member in their longitudinal direction and ~~abutting~~ abut edges for allowing the pair of operating pieces to abut against each other on inner edges substantially parallel to the outer edges.

A-In the binding device according to ~~claim 4~~ this preferred embodiment of the present invention ~~is that recited~~



~~in any one of claims 1 to 3, wherein,~~ the opening/closing member is preferably made of an elastic member, and the elastic member is provided between a pair of operating pieces ~~constituting~~defining the operating member to diagonally cross a direction connecting the bases of the binding rings secured to the operating pieces at a distance so as to move the pair of operating pieces in directions opposite to each other and to keep an opened/closed state of the binding rings.

~~AIn the binding device according to elaim 5 is that~~  
~~recited in claim 4, wherein~~ this preferred embodiment of the  
present invention, the opening/closing member is preferably made of an elastic member, and the elastic member is ~~provided~~arranged to bridge between the pair of operating pieces ~~constituting~~defining the operating member ~~so~~such that one end of the elastic member is fixed to one of the operating pieces and the other end thereof is fixed to the other operating piece.

~~AIn the binding device according to elaim 6 is that~~  
~~recited in claim 5, wherein~~ this preferred embodiment of the  
present invention, the opening/closing member is preferably made of an elastic member, and the elastic member is ~~provided~~arranged to bridge between the pair of operating pieces ~~constituting~~defining the operating member ~~so~~such that one end of the elastic member is fixed to a surface of one of the operating pieces, the surface being opposite to a surface

where the bases of the binding rings are fixed and the other end thereof is fixed to a surface of the other operating piece, the surface being opposite to the surface where the bases of the binding rings are fixed.

5        ~~A~~Alternatively, in the binding device according to claim  
~~7 is that recited in claim 4, wherein~~this preferred embodiment  
of the present invention, the opening/closing member is~~is~~may be  
made of an elastic member, one end of the elastic member is  
fixed to one of the operating pieces ~~constituting~~defining the  
10    operating member, and the other end thereof is fixed to the  
holding member across the other operating piece constituting  
the operating member.

~~A~~In the binding device according to claim~~8 is that~~  
~~recited in any one of~~this preferred embodiment of ~~claims 1 to 7,~~  
15    ~~wherein~~the present invention, the holding member has~~preferably~~  
includes holding walls ~~formed~~arranged substantially parallel  
to a longitudinal direction~~7,~~ the opening/closing member is  
made of an elastic member extending in a longitudinal  
direction~~7,~~ one end of the opening/closing member is fixed to  
20    an inner side of one of the holding walls of the holding  
member, whereas the other end of the opening/closing member is  
fixed to an inner side of the other holding wall facing the  
holding wall of the holding member at a distance in the  
longitudinal direction of the holding member, and the  
25    opening/closing member further extends so as to cross the one

operating piece fixed to the one holding wall side to reach  
the other operating piece abutting against the one operating  
piece to be retained thereby and then from a position retained  
by the one operating piece across an abutting portion between  
5 the pair of operating pieces to the other operating piece so  
as to be retained by the other operating piece.

~~A-In the binding device according to elaim 9 is that~~  
~~recited in claim 8, wherein~~this preferred embodiment of the  
present invention, the opening/closing member is preferably  
10 made of an elongated elastic member~~7~~, one end of the  
opening/closing member is fixed to a first fixing portion on  
an inner side of a first holding wall of one of the holding  
walls of the holding member, whereas the other end is fixed to  
a second fixing portion on an inner side of a second holding  
15 wall of the other of the holding walls facing and being  
substantially parallel to the first holding wall of the  
holding member at an equal distance from a center of the  
operating pieces in a longitudinal direction to that from the  
center to the first fixing portion~~7~~, the opening/closing  
20 member further extends across a first operating piece of one  
of the operating pieces in an approximately rectangular shape  
fixed to the one holding wall side to a second operating piece  
of the other of the operating pieces abutting against the  
first operating piece so as to be retained by a fourth fixing  
25 portion of the second operating piece so as to be slightly

shifted from a line passing through the first fixing portion to perpendicularly cross a moving direction of the second operating piece in the moving direction of the second operating piece when a first binding ring and a second binding ring of the binding rings are disengaged<sup>7</sup>, and the opening/closing member further extends from the fourth fixing portion to the first operating piece across longitudinal abutting edges between the first operating piece and the second operating piece to be retained by a third fixing portion of the first operating piece so as to be slightly shifted from a line passing through the second fixing portion to perpendicularly cross a moving direction of the first operating piece in the moving direction of the first operating piece when the first binding ring and the second binding ring are disengaged, thereby forming the opening/closing member in an approximately letter Z shape.

~~A-In the binding device according to claim 10 this preferred embodiment of the present invention is that recited in any one of claims 4 to 9, wherein,~~ the elastic member is selected from the group consisting of preferably one of a coil spring, a torsion spring, a flat spring, an elongated rubber, and an elongated urethane rubber.

According to another preferred embodiment of the present invention, a binding device includes<sup>7</sup> binding rings<sup>7</sup>, a holding member having ~~such~~ a length that ~~allows~~enables the

binding rings to be ~~provided~~arranged at a distance~~7~~ from each  
other, and an operating member movably fixed inside the  
holding member ~~so~~such that respective bases of the binding  
rings are fixed onto a surface of the operating member at a  
5 distance to secure the binding rings to the holding member. In  
this binding device, the operating member ~~is composed~~  
~~of~~includes a pair of operating pieces moving within the  
holding member in a longitudinal direction of the holding  
member~~7~~, the base of one of the binding rings is secured to  
10 one operating piece, and the base of the other binding ring is  
secured to the other operating piece. Furthermore, the  
operating pieces are fixed to the holding member ~~so~~such that  
abutting edges thereof are ~~kept~~maintained in an abutting state  
at a position separate from an inner surface of the holding  
15 member when the binding rings are closed, whereas the abutting  
edges are ~~kept~~maintained in a direction of approaching the  
inner surface of the holding member when the binding rings are  
opened~~7~~, and an opening/closing member is provided for  
shifting the binding rings in an opening direction such that  
20 the operating pieces are moved in the longitudinal direction  
of the holding member within the holding member and are  
~~kept~~maintained in a direction of approaching the inner surface  
of the holding member when the binding rings are opened.  
Therefore, the ~~binder~~binding device can be opened and closed  
25 by the opening/closing member.

According to this preferred embodiment of the present  
invention, the binding device ~~allowing that~~ allows relatively  
easy opening/closing by manually handling the binding rings of  
the binder ~~can be~~ is obtained.

5       The above-described ~~objects, and the other~~  
~~objects~~ elements, characteristics, features, and advantages of  
the present invention will be more apparent from the following  
description of preferred embodiments for carrying out the  
present invention with reference to the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing an example of a  
binding device ~~constituting an~~ according to a preferred  
15       embodiment of the present invention;

Fig. 2 is a plan view showing the binding device in a  
closed state;

Fig. 3 is a bottom view showing the binding device in a  
closed state;

20       Figs. 4(A) and ~~4~~ 4(B) are cross-sectional views showing  
the binding device in a closed state, where Fig. 4(A) is a  
cross-sectional view taken along the line A-A in Fig. 3, and  
Fig. 4(B) is a cross-sectional view taken along the line B-B  
in Fig. 3;

25       Fig. 5 is a plan view showing the binding device in an

opened state;

Fig. 6 is a bottom view showing the binding device in an opened state;

5 Figs. 7(A) and ~~4~~7(B) are cross-sectional views showing the binding device in an opened state, where Fig. 7(A) is a cross-sectional view taken along the line A-A in Fig. 6, and Fig. 7(B) is a cross-sectional view taken along the line B-B in Fig. 6;

Fig. 8 is a schematic plan view showing the vicinity of a latching portion of a binding ring in a closed state;

Fig. 9 is a schematic plan view showing the vicinity of the latching portion of the binding ring in an opened state;

Fig. 10 is a schematic view showing a structure of the binding device;

15 Fig. 11 is another schematic view showing the structure of the binding device;

Fig. 12 is a cross-sectional view showing a state where the binding device is attached to a cover;

Fig. 13 is a bottom view showing a binding device  
20 ~~constituting~~ according to another preferred embodiment according to the present invention in a closed state;

Fig. 14 is a plan view showing the binding device  
~~constituting the~~ according to a preferred embodiment of the present invention in a closed state;

25 Fig. 15 is a bottom view showing a binding device

~~constituting~~according to a further preferred embodiment  
according to the present invention in a closed state;

Fig. 16 is a plan view showing the binding device  
~~constituting~~according to the further preferred embodiment

5 according to the present invention in a closed state;

Fig. 17 is a bottom view showing the binding device in a  
closed state;

Fig. 18 is a bottom view showing the binding device at  
the transition from a closed state to an opened state;

10 Fig. 19 is a bottom view showing the binding device in an  
opened state;

Fig. 20 is a sectional view of the binding device in a  
closed state, taken along the line A-A in Fig. 17;

Fig. 21 is a sectional view of the binding device in an  
15 opened state, taken along the line A-A in Fig. 19;

Fig. 22 is a sectional view of the binding device in a  
closed state, taken along the line B-B in Fig. 17;

Fig. 23 is a sectional view of the binding device in an  
opened state, taken along the line B-B in Fig. 19;

20 Fig. 24 is a plan view showing the binding device in a  
closed state;

Figs. 25(A) and 25(B) are plan views showing the binding  
device in an opened state, where Fig. 25(A) is a plan view of  
the entire binder, and Fig. 25(B) is a plan view of a part of  
25 a binding ring;



Fig. 26 is a plan view showing operating pieces;

Fig. 27 is a cross-sectional view taken along the line A-A in Fig. 26;

Fig. 28 is a schematic view showing a structure of the  
5 binding device; and

Fig. 29 is another schematic view showing a structure of the binding device.

#### DETAILED DESCRIPTION OF ~~THE~~ PREFERRED EMBODIMENTS

10 Fig. 1 is a perspective view showing an exemplary binding device according to a preferred embodiment of the present invention. Fig. 2 is a plan view showing the binding device in a closed state, Fig. 3 is a bottom view showing the binding device in a closed state, and Figs. 4(A) and (B) are cross-  
15 sectional views showing the binding device in a closed state. Fig. 5 is a plan view showing the binding device in an opened state, Fig. 6 is a bottom view showing the binding device in an opened state, and Figs. 7(A) and (B) are cross-sectional views showing the binding device in an opened state. Fig. 8 is  
20 a schematic plan view showing the vicinity of a latching portion of a binding ring in a closed state, and Fig. 9 is a schematic plan view showing the vicinity of the latching portion of a binding ring in an opened state. Figs. 10 and 11 are schematic views respectively showing a structure of the  
25 binding device. Fig. 12 is a cross-sectional view showing a

state where the binding device is attached to a cover.

A binding device 10 is secured onto an inner surface of a spine between a pair of folding lines, that is, a right folding line and a left folding line, ~~formed~~ provided in the approximate center of a cover A. The cover A is made of a relatively hard sheet material, such as ~~a~~ cardboard. As a securing method, ~~there is a method of inserting~~ fastening tools such as a bolt and a nut or an eyelet are inserted into attachment holes 20 (described below in detail) ~~formed~~ provided at both ends of the binding device 10 in a longitudinal direction so as to secure the ~~binder~~ binding device 10 to the spine, thereby ~~uniting~~ fixing the binding device 10 ~~with~~ to the spine.

In this preferred embodiment, the description is made using a bolt and a nut as fastening tools. However, the fastening tools are not limited thereto, ~~for~~. For example, a screw, an eyelet, a rivet, and ~~the like~~ other suitable fastening tools can also be used. Moreover, a securing method of performing, for example, ultrasonic welding or high-frequency welding on the spine can also be used.

The binding device 10 includes a pair of binding rings, i.e., a first binding ring 12 and a second binding ring 14, a holding member 16, and an operating member 18. Each of the first binding ring 12 and the second binding ring 14 is made of a metal in an approximately annular shape. The holding

member 16 has ~~such~~ a length that ~~allows~~enables the first binding ring 12 and the second binding ring 14 to be ~~provided~~disposed at a distance ~~from one another~~. A base of each of the first binding ring 12 and the second binding ring 14 is  
5 secured to a surface of the operating member 18 ~~so~~ such that the first binding ring 12 and the second binding ring 14 are ~~provided~~disposed at a distance. The operating member 18 is movably fixed inside the holding member 16 ~~so~~ such that the first binding ring 12 and the second binding ring 14 are  
10 secured to the holding member 16.

A planar shape of the holding member 16 is approximately rectangular, having ~~such~~ a length that ~~allows~~enables the first binding ring 12 and the second binding ring 14 to be provided at a predetermined distance ~~from one another~~. Both ends of  
15 the holding member 16, that is, in the vicinity of the attachment holes 20 for attachment to the cover A, are ~~each~~ formed configured to have an approximately semicircular arc planar shape.

The holding member 16 has a bound article mounting  
20 portion 22 having an approximately semicircular arc cross-sectional shape. The bound article mounting portion 22 protrudes inwardly from the outer vicinities of the positions where the first binding ring 12 and the second binding ring 14 are fixed in a longitudinal direction toward the center. ~~There~~  
25 ~~is~~ The holding member 16 includes a space for housing the

operating piece 18 ~~and the like~~ therein inside the bound article mounting portion 22.

On both ends of the bound article mounting portion 22 of the holding member 16, holding walls for slidably holding the operating member 18 are provided substantially from one end to the other end of the bound article mounting portion 22 in its longitudinal direction. In this preferred embodiment, holding walls 24a and 24b are continuously provided so as to downwardly extend from the outer vicinities of the first binding ring 12 and the second binding ring 14 over ~~the~~ approximately the entire length. The holding walls 24a and 24b are parallel to each other and have an approximately identical plate-like shape. Furthermore, holding projections 24c and 24d are provided to protrude inward from the lower edges of the holding walls 24a and 24b at an appropriate distance. The holding projections 24c and 24d are ~~formed~~ configured so as to retain ~~the vicinity of~~ an outer edge 30b of a first operating piece 30 and ~~the vicinity of~~ an outer edge 32b of a second operating piece 32, respectively.

The operating member 18 described below in detail ~~and the like are~~ is housed within a space surrounded by the holding walls 24a and 24b and the bound article mounting portion 22.

First through holes 26 and second through holes 28 ~~for~~ respectively allowing configured to allow the first binding ring 12 and the second binding ring 14 to loosely pass

therethrough at a predetermined distance (a predetermined length determined by JIS or the like) are ~~perforated~~provided through the bound article mounting portion 22 of the holding member 16.

5           The pair of first through holes 26 and the pair of second through holes 28 are provided so as to correspond to a half ring 12a and a half ring 12b ~~constituting~~defining the first binding ring 12 and a half ring 14a and a half ring 14b ~~constituting~~defining the second binding ring 14, respectively.

10       The first through holes 26 are provided in a width direction of the holding member 16 at a predetermined distance. The second through holes 18 are provided in the same manner.

          The operating member 18 ~~is composed of~~includes a pair of operating pieces, i.e., the first operating piece 30 and the

15       second operating piece 32, each being made of a metal plate having an approximately rectangular planar shape.

          The first operating piece 30 and the second operating piece 32 respectively include, in their longitudinal direction~~+~~, an outer edge 30b and an outer edge 32b which are

20       parallel to the holding walls 24a and 24b and slide on inner surfaces of the holding walls 24a and 24b~~+~~, and abutting edges 30a and 32a ~~formed~~provided on the inner edges~~+~~, for abutting the pair of first operating piece 30 and second operating piece 32 against each other so as to be parallel to the outer

25       edges 30b and 32b. When the abutting edges 30a and 32a are

provided parallel to each other in a longitudinal direction within the space of the holding member 16, their inner edges are flexibly engaged with each other. More specifically, the abutting edges 30a and 32a abut against each other.

5 Simultaneously, the outer edges 30b and 32b are in contact with the inner surfaces of the holding walls 24a and 24b of the holding member 16.

When no external force is applied, the first and second operating pieces 30 and 32 are provided within the inner space  
10 of the holding member 16 so as to be ~~in a valley fold~~  
~~state~~folded downward, that is, to separate from the inner  
surface of the bound article mounting portion 22 of the  
holding member 16 (the abutting edges 30a and 32a are situated  
below a plane  $P_{XY}$  shown in Fig. 10) or to be ~~in a mountain~~  
15 ~~fold~~folded upward state, that is, to be directed in a  
direction approaching the inner surface of the bound article  
mounting portion 22 of the holding member 16 (the abutting  
edges 30a and 32a are situated above the plane  $P_{XY}$  shown in Fig.  
10) to ~~keep~~maintain the ~~valley fold state~~downward or the  
20 ~~mountain fold~~upward folded state.

The plane  $P_{XY}$  ~~contains~~includes horizontal axes  $Y_1$  and  $Y_2$   
and longitudinal axes  $X_1$  and  $X_2$  (shown in Fig. 10) passing  
through the ~~positions~~locations (four ~~positions~~locations) where  
the respective bases of the first binding ring 12 and the  
25 second binding ring 14 are secured to the first operating

piece 30 and the second operating piece 32.

For the operating member 18, the base of the half ring 12a ~~constituting~~defining the first binding ring 12 is secured onto a surface (that is, an upper surface) of one of the operating pieces, i.e., the first operating piece 30, which faces the inner surface of the bound article mounting portion 22 of the holding member 16. On the same surface, the base of the half ring 14a constituting the second binding ring 14 is secured at a predetermined distance from the half ring 12a.

The base of the half ring 12b ~~constituting~~defining the first binding ring 12 is secured onto a surface (that is, an upper surface) of the other operating piece, i.e., the second operating piece 32, which faces the inner surface of the bound article mounting portion 22 of the holding member 16. On the same surface, the base of the half ring 14b ~~constituting~~defining the second binding ring 14 is secured at a predetermined distance from the half ring 12b.

When the first binding ring 12 and the second binding ring 14 are closed, as shown in Figs. 4(A) and (B), the first operating piece 30 and the second operating piece 32 ~~constituting~~defining the operating member 18 are directed in such a direction that the abutting edges 30a and 32a separate away from the inner surface of the holding member 16 (the inner surface of the bound article mounting portion 22) (that is, get into a ~~valley fold~~downward folded state) ~~so~~ such that

the abutting edge 30a of the first operating piece 30 and the  
abutting edge 32a of the second operating piece 32 are  
~~kept~~maintained within the space of the holding member 16 in an  
abutting state. On the other hand, when the first binding ring  
12 and the second binding ring 14 are opened, as shown in Figs.  
5 7(A) and 7(B), the first operating piece 30 and the second  
operating piece 32 ~~constituting~~defining the operating member  
18 are directed in such a direction that the abutting edges  
30a and 32a get close to the inner surface of the holding  
10 member 16 (the inner surface of the bound article mounting  
portion 22) (that is, get into a ~~mountain-fold state~~ so-  
upward folded state) such that the abutting edge 30a of the  
first operating piece 30 and the abutting edge 32a of the  
second operating piece 32 are ~~kept~~maintained within the space  
15 of the holding member 16 in an abutting state.

The first operating piece 30 and the second operating  
piece 32 ~~constituting~~defining the operating member 18 are  
slidably provided within the space of the holding member 16 so  
as to be movable in the longitudinal direction of the first  
20 operating piece 30 and the second operating piece 32, that is,  
in a parallel direction to a line connecting the half ring 12a  
and the half ring 14a (a line X<sub>1</sub> (shown in Fig. 10)) secured to  
the first operating piece 30 and a line connecting the half  
ring 12b and the half ring 14b (a line X<sub>2</sub> (shown in Fig. 10))  
25 secured to the second operating piece 32 when the first



operating piece 30 and the second operating piece 32 are directed to a direction of approaching the inner surface of the bound article mounting portion 22 of the holding member 16, that is, in a ~~mountain fold state~~ upward folded state.

5           An opening/closing member 40 for shifting the first binding ring 12 and the second binding ring 14 in an opening/closing direction is provided on lower surfaces of the first operating piece 30 and the second operating piece 32, that is, on the surfaces opposite to the upper surfaces to  
10       which the bases of the first binding ring 12 and the second binding ring 14 are secured.

          The opening/closing member 40 is an elastic member selected from a coil spring, a torsion spring, a flat spring, an elongated rubber, and an elongated urethane rubber. In this  
15       preferred embodiment, an elongated coil tension spring having a longitudinal direction is provided so as to move the first operating piece 30 and the second operating piece 32 in the directions opposite to each other within the space of the holding member 16 in the longitudinal direction of the holding  
20       member 16. At the same time, the coil tension spring is provided so as to keep the abutting edge 30a of the first operating piece 30 and the abutting edge 32a of the second operating piece 32 ~~constituting~~ defining the holding member 30 in a direction ~~of~~ approaching the inner surface of the bound  
25       article mounting portion 22 of the holding member 16, that is,

in a ~~mountain fold state~~ an upward folded state.

One end of the opening/closing member 40 is fixed to a latching projection 30c ~~formed~~ provided on a lower surface of one of the operating pieces, that is, the first operating  
5 piece 30, whereas the other end thereof is fixed to a latching projection 32c ~~formed~~ provided on a lower surface of the other operating piece, that is, the second operating piece 32.

The latching projection 30c is ~~formed~~ provided at the ~~position~~ location shifted from the longitudinal center of the  
10 first operating piece 30 in a direction in which the first operating piece 30 moves when the first binding ring 12 and the second binding ring 14 are opened. The latching projection 32c is ~~formed~~ provided at the ~~position~~ location shifted from the longitudinal center of the second operating piece 32 in a  
15 direction in which the second operating piece 32 moves when the first binding ring 12 and the second binding ring 14 are opened.

The opening/closing member 40 ~~is diagonally provided to~~  
~~bridge~~ bridges between the first operating piece 30 and the  
20 second operating piece 32 so as to be extended when the abutting edge 30a of the first operating piece 30 and the abutting edge 32a of the second operating piece 32 are ~~kept in~~  
~~a valley fold~~ in a downward folded state (shown in Figs. 4(A) and (B)), that is, so as to ~~separate~~ separated away from the  
25 inner surface of the bound article mounting portion 22 of the

holding member 16. The opening/closing member 40 is configured ~~so~~ such that a force of restoring the original state acts in such an extended state.

The opening/closing member 40 ~~is provided to~~  
5 ~~bridge~~ bridges between the first operating piece 30 and the second operating piece 32 so as to diagonally cross the respective longitudinal directions of the first operating piece 30 and the second operating piece 32, that is, the line connecting the ~~position~~ location on the first operating piece  
10 30 where the half ring 12a is fixed and the ~~position~~ location where the half ring 14a is fixed (the longitudinal axis  $X_1$  (shown in Fig. 10)) and the line connecting the ~~position~~ location on the second operating piece 32 where the half ring 12b is fixed and the ~~position~~ location where the half  
15 ring 14b is fixed (the longitudinal axis  $X_2$  (shown in Fig. 10)).

When the first binding ring 12 and the second binding ring 14 ~~are started~~ begin to be opened, that is, a latching portion 50 of each of the first binding ring 12 and the second binding ring 14 is disengaged with fingers, the  
20 opening/closing member 40 acts to restore its original state, that is, acts in such a direction that the extended opening/closing member 40 contracts ~~so~~ such that the half ring 12a and the half ring 12b of the first binding ring 12 separate away from each other (in an  $O_1$  direction for the half  
25 ring 12a and in an  $O_2$  direction for the half ring 12b (shown in

Figs. 2 and 9)) and the half ring 14a and the half ring 14b of the second binding ring 14 separate away from each other (in the  $O_1$  direction for the half ring 14a and in the  $O_2$  direction for the half ring 14b (shown in Figs. 2 and 9)). As a result, the first operating piece 30 and the second operating piece 32 ~~constituting~~defining the operating member 18 are moved in directions opposite to each other.

More specifically, the first operating piece 30 moves in ~~such-a~~ direction such that the latching portion 50 is disengaged (in the  $O_1$  direction), ~~whereas-and~~ the second operating piece 32 moves in ~~such-a~~ direction such that the latching portion 50 is disengaged (in the  $O_2$  direction).

Furthermore, the opening/closing member 40 acts so as to separate the half rings 12a and 12b away from each other and the half rings 14a and 14b away from each other in a circumferential direction (in the directions of the horizontal axes  $Y_1$  and  $Y_2$  in Fig. 10).

The first operating piece 30 and the second operating piece 32 ~~constituting~~defining the operating member 18 gradually transit from the ~~valley-fold~~downward folded state to a planar state and then from the planar state to the ~~mountain-fold~~upward folded state.

When the first binding ring 12 and the second binding ring 14 are respectively opened, the opening/closing member 40 acts so as to keep the abutting edge 30a of the first

operating piece 30 and the abutting edge 32a of the second operating piece 32 in a ~~mountain-fold~~upward folded state, that is, in a state where they are close to the inner surface of the bound article mounting portion 22 of the holding member 16.

5           The first operating piece 30 and the second operating piece 32 ~~constituting~~defining the operating member 18 act as described above. In order to allow the first operating piece 30 and the second operating piece 32 to pivot about the abutting edges 30a and 32a without making any shifts,  
10       respectively, anti-shift protruding pieces 30e are provided for the first operating piece 30 to project slightly downward from the abutting edge 30a side toward the abutting edge 32a side, whereas anti-shift protruding pieces 32e are provided for the second operating piece 32 to project slightly downward  
15       from the abutting edge 32a side toward the abutting edge 30a side.

          The first binding ring 12 is composed of the semicircular arc-shaped half rings 12a and 12b so as to form an approximately annular shape, whereas the second binding ring  
20       14 is composed of the semicircular arc-shaped half rings 14a and 14b so as to form an approximately annular shape. The latching portions 50 are ~~formed~~provided at the tips of the half rings 12a and 12b and the tips of the half rings 14a and 14b, that is, at the top of the first binding ring 12 and the  
25       top of the second binding ring 14 ~~so~~such that the half rings

12a, 12b, 14a and 14b pass through binding holes perforated through a paper P in advance to bind the paper P.

The half rings 12a and 12b ~~constituting~~defining the first binding ring 12 are engaged with each other to form an annular shape by locking the latching portion 50 of the half rings 12a and 12b.

The half rings 14a and 14b ~~constituting~~defining the second binding ring 14 are engaged with each other to form an annular shape by locking the latching portion 50 of the half rings 14a and 14b.

The first binding ring 12 and the second binding ring 14 are provided so as to extend upward from the first operating piece 30 and the second operating piece 32, respectively, thereby forming a plane perpendicular to the plane  $P_{xy}$  ~~containing~~including the horizontal axes  $Y_1$  and  $Y_2$  and the longitudinal axes  $X_1$  and  $X_2$  (shown in Fig. 10) passing through the positions (four positions) where the bases of the first binding ring 12 and the second binding ring 14 are secured to the first operating piece 30 and the second operating piece 32.

A circular plane ~~formed~~defined by an axis  $Z_1$  (shown in Fig. 11) of the first binding ring 12 and a circular plane ~~formed~~defined by an axis  $Z_2$  (shown in Fig. 11) of the second binding ring 14 are parallel to each other ~~so~~such that the first binding ring 12 and the second binding ring 14 are perpendicular to the plane  $P_{xy}$  passing through the

~~positions~~locations where the first binding ring 12 and the second binding ring 14 are secured to the first operating piece 30 and the second operating piece 32.

The first binding ring 12 and the second binding ring 14  
5 are ~~constituted~~seconfigured such that their latching portions 50 are disengaged with fingers in the same directions.

A projection 52a corresponding to the tip and a recess 52b following the projection 52a ~~constituted~~define the latching portion 50 ~~formed~~provided at the tip of the half ring 12a  
10 ~~constituting~~defining the first binding ring 12, whereas a projection 54a corresponding to the tip and a recess 54b following the projection 54a ~~constituted~~define the latching portion 50 ~~formed~~provided at the tip of the half ring 12b. The projection 52a and the recess 52b, and the projection 54a and  
15 the recess 54b are ~~formed~~configured to protrude or to be concave in the opposite directions so as to be engaged with each other when the first binding ring 12 is closed. Each of the projections 52a and 54a has a slant edge from the tip toward its base. With the slant edges, the first binding ring  
20 12 and the second binding ring 14 can be opened/closed in a sliding manner.

A projection 56a at the tip and a recess 56b following the projection 56a ~~constituted~~define the latching portion 50 ~~formed~~provided at the top of the half ring 14a  
25 ~~constituting~~defining the second binding ring 14, whereas a

projection 58a at the tip and a recess 58b following the  
projection 58a ~~constituted~~define the latching portion 50  
~~formed~~provided at the top of the half ring 14b. The projection  
56a and the recess 56b, and the projection 58a and the recess  
5 58b are ~~formed~~configured to protrude or to be concave in the  
opposite directions so as to be engaged with each other when  
the second binding ring 14 is closed.

The projection 52a ~~constituting~~defining the latching  
portion 50 of the half ring 12a and the projection 56a  
10 ~~constituting~~defining the latching portion 50 of the half ring  
14a are ~~formed~~configured so as to protrude in the same  
direction.

The recess 54b ~~constituting~~defining the latching portion  
50 of the half ring 12b and the recess 58b  
15 ~~constituting~~defining the latching portion 50 of the half ring  
14b are ~~formed~~configured so as to be concaved in the same  
direction.

Therefore, the latching portion 50 of the first binding  
ring 12 can be disengaged by twisting the top of the first  
20 binding ring 12 with fingers. When the latching portion 50 of  
the first binding ring 12 is disengaged with fingers, the  
first operating piece 30 and the second operating piece 32  
move in the directions opposite to each other due to a force  
of the opening/closing member 40 for restoring its original  
25 state, that is, a contracting force of the opening/closing



member 40. More specifically, the first operating piece 30 and the second operating piece 32 act in such a direction that the projection 56a of the half ring 14a and the projection 58a of the half ring 14b ~~constituting~~defining the second binding ring 14 separate away from each other so as to separate ~~away~~ the projection 52a of the half ring 12a and the projection 54a of the half ring 12b of the first binding ring 12 from each other and to separate ~~away~~ the projection 56a of the half ring 14a and the projection 58a of the half ring 14b of the second binding ring 14 from each other.

As described above, in this preferred embodiment, the tops of the first binding ring 12 and the second binding ring 14 are twisted with fingers to disengage the latching portion 50 between the half rings 12a and 12b of the first binding ring 12 and the latching portion 50 between the half rings 14a and 14b of the second binding ring 14.

When the latching portion 50 between the half rings 12a and 12b of the first binding ring 12 and the latching portion 50 between the half rings 14a and 14b of the second binding ring 14 are brought into an engaged state, the abutting edge 30a of the first operating piece 30 and the abutting edge 32a of the second operating piece 32 ~~get into a valley fold~~are in a downward folded state. Since the opening/closing member 40 acts so as to contract in such a direction that the first operating piece 30 and the second operating piece 32 abut

against each other while the first operating piece 30 and the second operating piece 32 are in a ~~valley fold~~downward folded state, the engaged states of the respective latching portions 50 of the first binding ring 12 and the second binding ring 14 ~~can be kept~~are maintained.

For attachment of the binding device 10 to the cover A, after the lower edges of the holding walls 24a and 24b are brought into contact with the cover A, bolts and nuts may be inserted into the attachment holes 20 so as to attach the binding device 10 to the cover A. Moreover, as shown in Fig. 12, the binding device 10 may be attached to the cover A with spacers 60 for appropriately providing a space being interposed therebetween.

In the above-described preferred embodiment, a two-ring type binder with the first binding ring 12 and the second binding ring 14 has been described. However, multi-ring type binders with an increased number of rings, for example, a three-ring type, a four-ring type, a twenty-ring type, a twenty-six ring type or a thirty-ring type binder can be ~~realized.~~provided.

Next, another preferred embodiment according to the present invention will be described ~~mainly based on~~with reference to Figs. 13 and 14.

A binding device 110 according to this preferred embodiment has substantially the same structure as that of the

binding device 10 in the above-described preferred embodiment.  
Since the differences between the binding ~~device~~devices 110  
and 10 mainly consist in the operating member and the  
opening/closing member, the description will focus on these  
5 differences.

A notch 130c is ~~formed~~provided in the vicinity of the  
approximate center of an abutting edge 130a of a first  
operating piece 130 ~~constituting~~defining the binding device  
110, whereas a notch 132c is ~~formed~~provided in the vicinity  
10 of the approximate center of an abutting edge 132a of a second  
operating piece 132. A latching portion 130d for engaging an  
opening/closing member 140 is provided on one end of the notch  
130c in a protruding manner, whereas a latching portion 132d  
for engaging the opening/closing member 140 is provided on one  
15 end of the notch 132c in a protruding manner.

The latching portions 130d and 132d are ~~formed~~arranged so  
as to separate from each other in a direction of a line  $X_1$   
formed by connecting the bases of a first binding ring 112 and  
a second binding ring 114 secured to the first operating piece  
20 130 or a line  $X_2$  formed by connecting the bases of the first  
binding ring 112 and the second binding ring 114 secured to  
the second operating piece 132.

The opening/closing member 140 is provided within a space  
~~formed~~defined by an opening of the notch 130c and an opening  
25 of the notch 132c facing each other. One end of the

opening/closing member 140 is engaged to the latching portion 130d, whereas the other end is engaged to the latching portion 132d. Furthermore, one tip 140a of the opening/closing member 140 extends from the latching portion 130d so as to be engaged to the back of the second operating piece 132. The other tip 140b of the opening/closing member 140 extends from the latching portion 132d so as to be engaged to the back of the first operating piece 130.

In this manner, the opening/closing member 140 is diagonally provided to bridge between the first operating piece 130 and the second operating piece 132 so as to separate away the first operating piece 130 and the second operating piece 132 from each other in a width direction when the abutting edge 130a of the first operating piece 130 and the abutting edge 132a of the second operating piece 132 are in a ~~valley fold~~downward folded state, that is, are ~~kept~~maintained in ~~such a state to separate~~separated from the inner surface of a bound article mounting portion 122 of the holding member 116. The opening/closing member 140 is ~~formed~~configured to exert an extending force, that is, an elastic repulsion force in this state.

The opening/closing member 140 is provided so as to diagonally cross the respective longitudinal directions of the first operating piece 130 and the second operating piece 132, that is, a line connecting a ~~position~~location on the first

operating piece 130 where a half ring 112a is secured and a  
~~position~~location where a half ring 114a is secured (the line  $X_1$   
(shown in Fig. 13)) and a line connecting a ~~position~~location  
on the second operating piece 132 where a half ring 112b is  
5 secured and a ~~position~~location where a half ring 114b is  
secured (the line  $X_2$  (shown in Fig. 13)). Furthermore, when  
the opening/closing member 140 is in a closed state, one tip  
140a of the opening/closing member 140 is engaged to the  
second operating piece 132, whereas the other end 140b of the  
10 opening/closing member 140 is engaged to the first operating  
piece 130 to twist the opening/closing member 140.

Then, when the first binding ring 112 and the second  
binding ring 114 are ~~started to be~~ opened with hands, that is,  
the respective latching portions 150 of the first binding ring  
15 112 and the second binding ring 114 are disengaged, the first  
operating piece 130 and the second operating piece 132  
~~constituting~~defining an operating member 118 move in such a  
direction that the half rings 112a and 112b of the first  
binding ring 112 separate away from each other (in an  $O_1$   
20 direction for the half ring 112a, and in an  $O_2$  direction for  
the half ring 112b (shown in Fig. 14)) and a direction that  
the half rings 114a and 114b of the second binding ring 114  
separate away from each other (in the  $O_1$  direction for the half  
ring 114a, and in the  $O_2$  direction for the half ring 114b  
25 (shown in Fig. 14)) due to the elastic force of the

opening/closing member 140. At the same time, the twisted opening/closing member 140 is going to restore to its original state, acting so as to separate ~~away~~ the half rings 112a and 112b from each other and the half rings 114a and 114b from each other in a circumferential direction (in an O<sub>3</sub> direction for the half rings 112a and 114a, and in an O<sub>4</sub> direction for the half rings 112b and 114b).

More specifically, due to the elastic force of the opening/closing member 140, the first operating piece 130 moves in ~~such~~ a direction to disengage the latching portion 150 (in the O<sub>1</sub> direction), whereas the second operating piece 132 moves in ~~such~~ a direction to disengage the latching portion 150 (in the O<sub>2</sub> direction).

The first operating piece 130 and the second operating piece 132 ~~constituting~~ defining the operating member 118 gradually ~~transit-move~~ move from a ~~valley-fold~~ downward folded state to a plane state, and then from the plane state to a ~~mountain-fold~~ an upward folded state.

Then, when the first binding ring 112 and the second binding ring 114 are opened, the opening/closing member 140 acts so as to keep a ~~mountain-fold~~ an upward folded state of the abutting edge 130a of the first operating piece 130 and the abutting edge 132a of the second operating piece 132, that is, a state where the abutting edges 130a and 132a ~~get~~ are close to the inner surface of the bound article mounting

portion 122 of the holding member 116.

Next, a further preferred embodiment according to the present invention will be described ~~mainly based on~~ with reference to Figs. 15 and 16.

5 A binding device 210 according to this preferred embodiment has substantially the same structure as that of the binding device 10 in the above-described preferred embodiment. Since a difference between the binding ~~device~~devices 210 and 10 ~~mainly consists~~ is primarily in a bridging structure of the  
10 opening/closing member, the description will focus on ~~the~~ this difference.

An opening/closing member 240 is composed of two elastic members (a first opening/closing member 242 and a second opening/closing member 244). One end of the first  
15 opening/closing member 242 ~~constituting~~ defining the opening/closing member 240 is secured to a latching projection 230c ~~formed~~ provided on a lower surface of one operating piece, that is, a first operating piece 230, whereas the other end of the first opening/closing member 242 is secured to a latching  
20 projection 232d ~~formed~~ provided on an inner surface of one holding wall 224b of a holding member 216 across the other operating piece, that is, a second operating piece 232. One end of the second opening/closing member 244 ~~constituting~~ defining the opening/closing member 240 is secured  
25 to a latching projection 232c ~~formed~~ provided on a lower

surface of the other operating piece, that is, the second operating piece 232, whereas the other end of the second opening/closing member 244 is secured to a latching projection 230d ~~formed~~provided on an inner surface of the other holding wall 224a of the holding member 216 across the other operating piece, that is, the first operating piece 230.

The opening/closing member 240 is diagonally provided between the first operating piece 230 and the holding wall 224b and between the second operating piece 232 and the holding wall 224a so as to be extended when an abutting edge 230a of the first operating piece 230 and an abutting edge 232a of the second operating piece 232 are in a ~~valley~~folded state, that is, are ~~kept to~~separated from the inner surface of a bound article mounting portion 222 of the holding member 216. The opening/closing member 240 is ~~formed~~configured to exert a force of restoring its original state in this state.

The opening/closing member 240 is provided so as to diagonally cross the respective longitudinal directions of the first operating piece 230 and the second operating piece 232, that is, a line connecting a ~~position~~location on the first operating piece 230 where a half ring 212a is secured and a ~~position~~location where a half ring 214a is secured (a line X<sub>1</sub> (shown in Fig. 15)) and a line connecting a ~~position~~location on the second operating piece 232 where a half ring 212b is



secured and a ~~position~~location where a half ring 214b is secured (a line  $X_2$  (shown in Fig. 15)).

Then, when the first binding ring 212 and the second binding ring 214 are ~~started to be~~ opened with hands, that is, the respective latching portions 250 of the first binding ring 212 and the second binding ring 214 are disengaged, the first operating piece 230 and the second operating piece 232 ~~constituting~~defining an operating member 218 move in such a direction that the half rings 212a and 212b of the first binding ring 212 separate away from each other (in an  $O_1$  direction for the half ring 212a, and in an  $O_2$  direction for the half ring 212b (shown in Fig. 16)) and a direction that the half rings 214a and 214b of the second binding ring 214 separate away from each other (in the  $O_1$  direction for the half ring 214a, and in the  $O_2$  direction for the half ring 214b (shown in Fig. 16)). At the same time, the opening/closing member 240 is going to restore its original state, that is, the extended opening/closing member 240 acts to contract itself, and acts so as to separate away the half rings 212a and 212b from each other and the half rings 214a and 214b from each other in a circumferential direction (in an  $O_3$  direction for the half rings 212a and 214a, and in an  $O_4$  direction for the half rings 212b and 214b).

More specifically, due to the elastic force of the opening/closing member 240, the first operating piece 230

moves in ~~such~~ a direction to disengage the latching portion 250 (in the  $O_1$  direction), whereas the second operating piece 232 moves in ~~such~~ a direction to disengage the latching portion 250 (in the  $O_2$  direction).

5           The first operating piece 230 and the second operating piece 232 constituting the operating member 218 gradually transit from a valley fold state to a plane state, and then from the plane state to a mountain fold state.

          Then, when the first binding ring 212 and the second  
10 binding ring 214 are respectively opened, the opening/closing member 240 acts so as to ~~keep a mountain fold~~ maintain an upward folded state of the abutting edge 230a of the first operating piece 230 and the abutting edge 232a of the second operating piece 232, that is, a state where the abutting edges  
15 230a and 232a are close to the inner surface of the bound article mounting portion 222 of the holding member 216.

          A further preferred embodiment according to the present invention will now be described.

          Fig. 17 is a bottom view showing a binding device in a  
20 closed state~~7~~, Fig. 18 is a bottom view showing the binding device at the transition from a closed state to an opened state~~7~~, Fig. 19 is a bottom view showing the binding device in an opened state; Fig. 20 is a sectional view of the binding device in a closed state, taken along the line A-A in Fig. 17~~7~~,  
25 and Fig. 21 is a sectional view of the binding device in an

opened state, taken along the line A-A in Fig. 19. Fig. 22 is a sectional view of the binding device in a closed state, taken along the line B-B in Fig. 17; Fig. 23 is a sectional view of the binding device in an opened state, taken along the line B-B in Fig. 19~~+~~1, and Fig. 24 is a plan view showing the binding device in a closed state~~+~~1. Figs. 25(A) and 25(B) are plan views showing the binding device in an opened state. Fig. 26 is a plan view showing operating pieces, and Fig. 27 is a cross-sectional view taken along the line A-A in Fig. 26. Figs. 28 and 29 are schematic views respectively showing a structure of the binding device.

A binding device 310 includes~~+~~ a first binding ring 312 and a second binding ring 314, each being made of a metal in an approximately annular shape~~+~~1, a holding member 316~~+~~1, and an operating member 318. The holding member 316 has ~~such~~ a length that ~~allows~~enables the first binding ring 312 and the second binding ring 314 to be provided at a distance. A base of each of the first binding ring 312 and the second binding ring 314 is secured onto a surface of the operating member 318 ~~so~~such that the first binding ring 312 and the second binding ring 314 are provided at a distance. The operating member 318 is movably fixed inside the holding member 316 ~~so~~such that the first binding ring 312 and the second binding ring 314 are secured to the holding member 316.

A planar shape of the holding member 316 is approximately

rectangular, having such a length that allows the first binding ring 312 and the second binding ring 314 to be provided at a predetermined distance. Both ends of the holding member 316, that is, in the vicinity of attachment holes 320  
5 for attachment to the cover A, are each formed to have an approximately semicircular arc planar shape.

The holding member 316 has a bound article mounting portion 322 having an approximately semicircular arc cross-sectional shape. The bound article mounting portion 322  
10 protrudes inwardly from the outer vicinities of the positions where the first binding ring 312 and the second binding ring 314 are secured in a longitudinal direction toward the center. There is a space for housing the operating piece 318 and the like therein inside the bound article mounting portion 322.

15 On both ends of the bound article mounting portion 322 of the holding member 316, holding walls for slidably retaining the operating member 318 are provided in a longitudinal direction substantially from one end to the other end of the bound article mounting portion 322. In this preferred  
20 embodiment, first and second holding walls 324a and 324b are continuously provided so as to extend downward from the outer vicinities of the first binding ring 312 and the second binding ring 314 over the approximately entire length. The first and second holding walls 324a and 324b are provided so  
25 as to be parallel to each other at an appropriate distance.

Furthermore, holding projections 324c and 324d are provided inward from the lower edges of the holding walls 324a and 324b at an appropriate distance. The holding projections 324c and 324d are ~~formed~~configured so as to retain the vicinity of an  
5 outer edge 330b of a first operating piece 330 and the vicinity of an outer edge 332b of a second operating piece 332, respectively, to prevent the first operating piece 330 and the second operating piece 332 from coming off of the holding member 316.

10 The operating member 318 described below in detail ~~and the like are~~is housed within a space surrounded by the first and second holding walls 324a and 324b and the bound article mounting portion 322.

First through holes 326 and second through holes 328 for  
15 respectively allowing the first binding ring 312 and the second binding ring 314 to loosely pass therethrough ~~at~~with a predetermined distance (a predetermined length determined by JIS or the like) therebetween are ~~perforated~~provided through the bound article mounting portion 322 of the holding member  
20 316.

The pair of first through holes 326 and the pair of second through holes 328 are provided so as to correspond to a half ring 312a and a half ring 312b ~~constituting~~defining the first binding ring 312 and a half ring 314a and a half ring  
25 314b ~~constituting~~defining the second binding ring 314,

respectively. The first through holes 326 are provided in a width direction of the holding member 316 ~~at~~ with a predetermined distance therebetween. The second through holes 318 are provided in the same manner.

5        The operating member 318 ~~is composed of a pair of~~ includes the first operating piece 330 and the second operating piece 332, each being made of a metal plate having an approximately rectangular planar shape.

         The first operating piece 330 and the second operating  
10   piece 332 have substantially the same shape. The first operating piece 330 includes÷ an approximately linear abutting edge 330a on the inner side~~÷~~ ÷ and an approximately linear outer edge 330b on the outer side. In the same manner, the second operating piece 332 includes÷ an approximately linear  
15   abutting edge 332a on the inner side~~÷~~ ÷ and an approximately linear outer edge 332b on the outer side. ~~Owing~~ Due to these edges, when the first operating piece 330 and the second operating piece 332 are provided parallel to each other in their longitudinal directions within the space of the holding  
20   member 316, their inner edges are flexibly engaged with each other.

         More specifically, the abutting edges 330a and 332a abut against each other, and simultaneously, the outer edges 330b and 332b are in contact with the inner surfaces of the first  
25   and second holding walls 324a and 324b of the holding member

316 between them.

In order to allow the first operating piece 330 and the second operating piece 332 to pivot about the abutting edges 330a and 332a without ~~making any shifts, respectively~~shifting,  
5 an anti-shift protruding piece 330e is ~~formed~~provided on the abutting edge 330a of the first operating piece 330 to project slightly downward toward the second operating piece 332, whereas an anti-shift protruding piece 332e is ~~formed~~provided on the abutting edge 332a of the second operating piece 332 to  
10 project slightly downward toward the first operating piece 330.

A sliding projection 330f for regulating a sliding width is ~~formed~~provided on the abutting edge 330a of the first operating piece 330 so as to project toward the second operating piece 332. At the same time, a sliding recess 330g  
15 is ~~formed~~provided on the abutting edge 330a at an appropriate distance from the sliding projection 330f. In the same manner, a sliding projection 332f is ~~formed~~provided on the abutting edge 332a of the second operating piece 332 at the  
~~position~~location corresponding to the sliding recess 330g of  
20 the first operating piece 330 so as to project toward the first operating piece 330. At the same time, a sliding recess 332g is ~~formed~~provided on the abutting edge 332a at the  
~~position~~location corresponding to the sliding projection 330f of the first operating piece 330. The sliding projection 330f  
25 of the first operating piece 330 moves within a length of the

sliding recess 332g of the second operating piece 332 in a longitudinal direction, whereas the sliding projection 332f of the second operating piece 332 moves within a length of the sliding recess 330g of the first operating piece 330 in a longitudinal direction.

The first and second operating pieces 330 and 332 are provided within the inner space of the holding member 316 so as to be situated parallel to each other on a horizontal plane, that is, to be separate from the inner surface of the bound article mounting portion 322 of the holding member 316 (the abutting edges 330a and 332a are situated on approximately the same plane  $P_{xy}$  shown in Fig. 28) or to be ~~kept~~ maintained in a ~~mountain-fold~~ an upward folded state, that is, to be directed to approach the inner surface of the bound article mounting portion 322 of the holding member 316 (the abutting edges 330a and 332a are situated above the plane  $P_{xy}$  shown in Fig. 28) and to ~~keep~~ maintain the horizontal plane state or the ~~mountain-fold~~ upward folded state, when no external force is applied. The plane  $P_{xy}$  ~~contains~~ includes horizontal axes  $Y_1$  and  $Y_2$  and longitudinal axes  $X_1$  and  $X_2$  (shown in Fig. 28) passing through the ~~positions~~ locations (four ~~positions~~ locations) where the respective bases of the first binding ring 312 and the second binding ring 314 are secured to the first operating piece 330 and the second operating piece 332.

For the operating member 318, the base of the half ring



312a ~~constituting~~defining the first binding ring 312 is  
secured onto a surface (that is, an upper face) of one of the  
operating pieces, that is, the first operating piece 330,  
which faces the inner surface of the bound article mounting  
5 portion 322 of the holding member 316. On the same surface,  
the base of the half ring 314a ~~constituting~~defining the second  
binding ring 314 is secured at a predetermined distance from  
the half ring 312a.

On a surface (that is, an upper surface) of the other  
10 operating piece, that is, the second operating piece 332,  
which faces the inner surface of the bound article mounting  
portion 322 of the holding member 316, the base of the half  
ring 312b ~~constituting~~defining the first binding ring 312 is  
secured. On the same surface, the base of the half ring 314b  
15 ~~constituting~~defining the second binding ring 314 is secured at  
a predetermined distance from the half ring 312b.

When the first binding ring 312 and the second binding  
ring 314 are closed, as shown in Figs. 20 and 22, the first  
operating piece 330 and the second operating piece 332  
20 ~~constituting~~defining the operating member 318 are directed in  
~~such~~ a direction such that the abutting edges 330a and 332a  
separate away from the inner surface of the holding member 316  
(the inner surface of the bound article mounting portion 322)  
(that is, in parallel arrangement on the approximately  
25 horizontal plane) so that the abutting edge 330a of the first

operating piece 330 and the abutting edge 332a of the second  
operating piece 332 are ~~kept~~maintained within the space of the  
holding member 316 in an abutting state. On the other hand,  
when the first binding ring 312 and the second binding ring  
5 314 are opened, as shown in Figs. 21 and 23, the first  
operating piece 330 and the second operating piece 332  
~~constituting~~defining the operating member 318 are directed in  
such a direction that the abutting edges 330a and 332a ~~get~~are  
close to the inner surface of the holding member 316 (the  
10 inner surface of the bound article mounting portion 322) (that  
is, ~~get into a mountain fold~~are in a an upward folded state)  
~~so~~such that the abutting edge 330a of the first operating  
piece 330 and the abutting edge 332a of the second operating  
piece 332 are ~~kept~~maintained within the space of the holding  
15 member 316 in an abutting state.

The first operating piece 330 and the second operating  
piece 332 ~~constituting~~defining the operating member 318 are  
slidably provided so as to be movable in the longitudinal  
direction of the first operating piece 330 and the second  
20 operating piece 332, that is, in a parallel direction to a  
line connecting the half ring 312a and the half ring 314a (a  
longitudinal line X<sub>1</sub> (shown in Fig. 28)) secured to the first  
operating piece 330 and a line connecting the half ring 312b  
and the half ring 314b (a longitudinal line X<sub>2</sub> (shown in Fig.  
25 28)) secured to the second operating piece 332 when the first

operating piece 330 and the second operating piece 332 get close to the inner surface of the bound article mounting portion 322 of the holding member 316, that is, in a ~~mountain-fold~~ an upward folded state.

5           An opening/closing member 340 for shifting the first binding ring 312 and the second binding ring 314 in an opening/closing direction is provided on lower surfaces of the first operating piece 330 and the second operating piece 332, that is, the surfaces opposite to the upper surfaces to which  
10 the bases of the first binding ring 312 and the second binding ring 314 are secured.

          The opening/closing member 340 is provided so as to move the first operating piece 330 and the second operating piece 332 in directions opposite to each other within the space of  
15 the holding member 316 in the longitudinal direction of the holding member 316. At the same time, the opening/closing member 340 is provided so as to keep the abutting edge 330a of the first operating piece 330 and the abutting edge 332a of the second operating piece 332 ~~constituting~~ defining the  
20 holding member 318 in a direction of approaching the inner surface of the bound article mounting portion 322 of the holding member 316, that is, in a ~~mountain-fold~~ an upward folded state.

          The opening/closing member 340 ~~is formed of~~ includes an  
25 elongated coil spring. One end of the opening/closing member

340 is fixed to a first fixing portion 325e on the inner side of the first holding wall 324a of the holding member 316, whereas the other end thereof is fixed to a second fixing portion 325f on the inner side of the second holding wall 324b which faces the first holding wall 324a of the holding member 316 so as to be parallel thereto. The first fixing portion 325e and the second fixing portion 325f are provided at the same distance  $R_1$  from a center C in the longitudinal direction of the first operating piece 330 and the second operating piece 332 (see Figs. 17 and 26).

The opening/closing member 340 is provided across the first operating piece 330 in an approximately rectangular shape fixed to the first holding wall 324a side to reach the second operating piece 332 abutting against the first operating piece 330. The opening/closing member 340 is slightly shifted from a line perpendicular to the first fixing portion 325e and the respective abutting edges 330a and 332a of the operating pieces 330 and 332 (an axis perpendicular to the moving direction) in such a direction that the second operating piece 332 moves when the respective latching portions 350 of the first binding ring 312 and 314 are disengaged. In this state, the opening/closing member 340 is retained by a fourth fixing portion 332d of the second operating piece 332. Subsequently, the opening/closing member 340 extends from the fourth fixing portion 332d to the first

operating piece 330 across the respective abutting edges 330a and the 332a of the first operating piece 330 and the second operating piece 332. The opening/closing member 340 is slightly shifted from an edge perpendicular to the second fixing portion 325f and the respective abutting edges 330a and 332a of the operating pieces 330 and 332 (an axis perpendicular to the moving direction) in such a direction that the first operating piece 330 moves when the respective latching portions 350 of the first binding ring 312 and 314 are disengaged. In this state, the opening/closing member 340 is retained by a third fixing portion 330d of the first operating piece 330.

~~The~~As a whole, the opening/closing member 340 ~~formed~~is configured in an approximately letter Z shape ~~as a whole~~.

The opening/closing member 340 is diagonally provided to bridge between the first operating piece 330 and the second operating piece 332 so as to be extended when the abutting edge 330a of the first operating piece 330 and the abutting edge 332a of the second operating piece 332 are in a horizontal plane state (shown in Figs. 20 and 22), that is, so as to separate away from the inner surface of the bound article mounting portion 322 of the holding member 316. The opening/closing member 340 is configured ~~so~~such that a force ~~of restoring~~to restore the opening/closing member 340 to the original state acts in such an extended state.

The opening/closing member 340 is provided to bridge between the first operating piece 330 and the second operating piece 332 so as to diagonally cross the respective longitudinal directions of the first operating piece 330 and the second operating piece 332, that is, the line connecting the ~~position~~location of the first operating piece 330 where the half ring 312a is fixed and the ~~position~~location where the half ring 314a is fixed (the longitudinal axis  $X_1$  (shown in Fig. 28)) and the line connecting the ~~position~~location of the second operating piece 332 where the half ring 312b is fixed and the ~~position~~location where the half ring 314b is fixed (the longitudinal axis  $X_2$  (shown in Fig. 28)).

When the first binding ring 312 and the second binding ring 314 ~~are started~~begin to be opened, that is, the latching portion 350 of each of the first binding ring 312 and the second binding ring 314 is disengaged with fingers, the opening/closing member 340 acts to restore its original state, as shown in Fig. 18, that is, in such a direction that the extended opening/closing member 340 contracts ~~so~~such that the half ring 312a and the half ring 312b of the first binding ring 312 separate away from each other (in an  $O_1$  direction for the half ring 312a and in an  $O_2$  direction for the half ring 312b (shown in Fig. 24)) and the half ring 314a and the half ring 314b of the second binding ring 314 separate away from each other (in the  $O_1$  direction for the half ring 314a and in

the  $O_2$  direction for the half ring 314b (shown in Fig. 24)).

As a result, the first operating piece 330 and the second operating piece 332 ~~constituting~~defining the operating member 318 are moved in directions opposite to each other.

5           More specifically, the first operating piece 330 moves in ~~such~~ a direction such that the latching portion 350 is disengaged (in the  $O_1$  direction), whereas the second operating piece 332 moves in ~~such~~ a direction such that the latching portion 350 is disengaged (in the  $O_2$  direction).

10           Furthermore, the opening/closing member 340 acts so as to separate the half rings 312a and 312b away from each other and the half rings 314a and 314b away from each other in a circumferential direction (in the directions of the horizontal axes  $Y_1$  and  $Y_2$  in Fig. 28).

15           The first operating piece 330 and the second operating piece 332 ~~constituting~~defining the operating member 318 gradually ~~transit~~move from the horizontal plane state to a ~~mountain-fold~~an upward folded state.

20           When the first binding ring 312 and the second binding ring 314 are opened, the opening/closing member 340 acts so as to ~~keep~~maintain the abutting edge 330a of the first operating piece 330 and the abutting edge 332a of the second operating piece 332 in a ~~mountain-fold~~an upward folded state, that is, in a state where they are close to the inner surface of the  
25   bound article mounting portion 322 of the holding member 316.

The first binding ring 312 is composed of the  
semicircular arc-shaped half rings 312a and 312b so as to form  
an approximately annular shape, whereas the second binding  
ring 314 is composed of the semicircular arc-shaped half rings  
5 314a and 314b so as to form an approximately annular shape.  
The latching portions 350 are ~~formed~~provided at the tips of  
the half rings 312a and 312b and the tips of the half rings  
314a and 314b, that is, at the top of the first binding ring  
312 and the top of the second binding ring 314 ~~so~~such that  
10 the half rings 312a, 312b, 314a and 314b pass through binder  
holes perforated through a paper P in advance to bind the  
paper P.

The half rings 312a and 312b ~~constituting~~defining the  
first binding ring 312 are engaged with each other to form an  
15 annular shape by locking the latching portion 350 of the half  
rings 312a and 312b.

The half rings 314a and 314b ~~constituting~~defining the  
second binding ring 314 are engaged with each other to form an  
annular shape by locking the latching portion 350 of the half  
20 rings 314a and 314b.

The first binding ring 312 and the second binding ring  
314 are provided so as to extend upward from the first  
operating piece 330 and the second operating piece 332 so as  
to ~~form~~define a plane perpendicular to the plane  $P_{xy}$  containing  
25 the horizontal axes  $Y_1$  and  $Y_2$  and the longitudinal axes  $X_1$  and



$X_2$  (shown in Fig. 28) passing through the ~~positions~~locations (four ~~positions~~locations) where the bases of the first binding ring 312 and the second binding ring 314 are secured to the first operating piece 330 and the second operating piece 332.

5 A circular plane ~~formed~~defined by an axis  $Z_1$  (shown in Fig. 29) of the first binding ring 312 and a circular plane formed by an axis  $Z_2$  (shown in Fig. 29) of the second binding ring 314 are parallel to each other ~~so~~such that the first binding ring 312 and the second binding ring 314 are perpendicular to the  
10 plane  $P_{XY}$  passing through the ~~positions~~locations where the first binding ring 312 and the second binding ring 314 are secured to the first operating piece 330 and the second operating piece 332.

Therefore, the latching portion 350 of the first binding  
15 ring 312 can be disengaged by twisting the top of the first binding ring 312 with fingers. When the latching portion 350 of the first binding ring 312 is disengaged with fingers, the first operating piece 330 and the second operating piece 332 move in ~~the~~ directions opposite to each other due to a force  
20 of the opening/closing member 340 for restoring its original state, that is, a contracting force of the opening/closing member 340. More specifically, as shown in Figs. 24 and 25, the first operating piece 330 and the second operating piece 332 act in ~~such~~a direction such that the projection 356a of  
25 the half ring 314a and the projection 358a of the half ring

314b ~~constituting~~defining the second binding ring 314 separate away from each other so as to in turn separate away the projection 352a of the half ring 312a and the projection 354a of the half ring 312b of the first binding ring 312 from each other and to separate away the projection 356a of the half ring 314a and the projection 358a of the half ring 314b of the second binding ring 314 from each other.

As described above, in this preferred embodiment, the tops of the first binding ring 312 and the second binding ring 314 are ~~just~~merely twisted with fingers to disengage the latching portion 350 between the half rings 312a and 312b of the first binding ring 312 and the latching portion 350 between the half rings 314a and 314b of the second binding ring 314.

When the latching portion 350 between the half rings 312a and 312b of the first binding ring 312 and the latching portion 350 between the half rings 314a and 314b of the second binding ring 314 are brought into an engaged state, the abutting edge 330a of the first operating piece 330 and the abutting edge 332a of the second operating piece 332 ~~get~~are moved into a horizontal state. Since the opening/closing member 340 acts so as to contract in ~~such~~ a direction such that the first operating piece 330 and the second operating piece 332 abut against each other while the first operating piece 330 and the second operating piece 332 are in a

horizontal state, the engaged states of the respective  
latching portions 350 of the first binding ring 312 and the  
second binding ring 314 ~~can be kept~~ maintained.

5 ~~INDUSTRIAL APPLICABILITY~~

As described above, the ~~binder~~ binding device according to  
the present invention can be applied for use as a  
~~binder~~ binding device for a ring binder or file.

While the present invention has been described with  
10 respect to preferred embodiments, it will be apparent to those  
skilled in the art that the disclosed invention may be modified  
in numerous ways and may assume many embodiments other than  
those specifically set out and described above. Accordingly, it  
is intended by the appended claims to cover all modifications  
15 of the invention which fall within the true spirit and scope of  
the invention.